

APPENDIX A

PART I

EVOLUTION IN COMPANY'S APPROACH TO DG/CHP

Hawaii's electric utilities cannot just be in the business of offering central station generation, as they have been told by legislators, by regulators, by the press, by the public and by their customers. They must be able to offer their customers an expanded array of choices that promote the State's energy objectives of having a reliable and affordable energy infrastructure, while promoting energy efficiency and the use of renewable resources.

The objectives of promoting combined heat and power systems ("CHP") should be to encourage energy-efficiency, to accelerate the implementation of cost-effective CHP, to provide customer choices, and to avoid negative impacts on other customers. These are not only societal objectives, they are all utility objectives. Installing, owning, operating and maintaining CHP as a regulated utility will substantially further all of these objectives.

History of DG/CHP

The history of distributed generation ("DG") helps illustrate why utility offered CHP is part of a natural progression:

- (a) Initially, most customer-owned generation was in the form of large scale cogenerating facilities. On the mainland, these types of facilities were installed by industrial users such as refineries, which had steam requirements. In Hawaii, they were installed by sugar mills, which also had steam requirements, but had bagasse waste to burn as well. The installation of this type of facility was encouraged by the Public Utility Regulatory Policies Act of 1978 (PURPA).
- (b) At the same time, many customers have installed their own backup generators, which are only operated on an emergency basis when the utility service is out. Some utilities (North Carolina, Florida, Wisconsin) are now offering to provide backup generators at customer sites on a tariff basis.
- (c) The next step was to consider the use of customer-owned backup generators for peaking purposes. This was considered by HELCO as part of its Big Island contingency plan. One of the difficulties is that the generators may be permitted by environmental regulators to run only when there is a utility service outage. Some of the utilities that have offered

utility tariff backup generator service (North Carolina, Florida) have considered expanding those tariffs to provide for the right to run the generation for peaking purposes, at least on a limited basis.

- (d) Distributed generation is being used to address transmission and distribution problems. (In Hawaii, MECO installed two diesel generators at its Hana substation in April 2001 for this purpose.)
- (e) Utilities have considered installing distributed generation at utility-owned sites to meet short-term power requirements. (In Hawaii, HELCO installed four one MW diesel-fired generating units at four substation sites as part of its generation contingency plan.)
- (f) CHP units now offer the ability for small-scale installations to use the waste heat for purposes like heating water and cooling water (through the use of absorption chillers). Small customers, however, generally do not want to own, operate and maintain the units. Again, it is appropriate (at least in unique places like Hawaii) for the utility to offer CHP installations -- where it makes sense for individual customers and the utility's customers as a whole.

Company's Approach to DG/CHP

As the Commission and its staff are aware, the Company has been and continues to be concerned about the impacts of "uneconomic bypass" (see detailed explanation, below) on all customers (as well as on shareholders between rate cases). At the same time, the Company has recognized the potential benefits of distributed generation ("DG") in general, and combined heat and power ("CHP") applications of DG in particular,¹ and has undertaken substantial steps to better understand the benefits, impacts, and costs of DG and CHP. As a result, the Company's approach to addressing the issues raised by uneconomic bypass, and to addressing the increasing demand for CHP, has evolved rapidly in the last three years, just as the potential for cost-effective applications of CHP in Hawaii has rapidly evolved.

It may be helpful to the Commission in understanding the Company's current plans to offer CHP as a regulated service if a relatively brief summary of this evolutionary process is provided. Since this process has involved a number of regulatory filings affecting the Company's rates, and a number of informational presentations (in public forums and to the Commission) with respect to the Company's DG/CHP plans, the summary will refer to those where possible.

¹ CHP is a form of cogeneration ("Cogen").

The Company's evolving approach to DG/Cogen (and now CHP) can be divided into four phases:

- Phase 1 - DG/Cogen viewed as "uneconomic bypass" threat, with unaccounted for impacts on the utility system and potential adverse impacts on participating and non-participating customers.
- Phase 2 - DG/Cogen installations are becoming more cost-effective, there is increasing public policy support, and more information regarding the long-term business potential of DG/Cogen should be developed.
- Phase 3 - Pilot projects should be conducted, with PUC approval, to respond to customer interest, to gain hands-on experience and to assess the system benefit potential of DG/Cogen as a complement to central station generation.
- Phase 4 - Pre-packaged CHP systems can cost-effectively be offered to eligible customers under a CHP tariff.

Phase 1

The initial installations of small-scale DG units at customers' sites (for other than emergency backup) were often problematic for both the customers and the utility. From the customers' standpoint, there were performance problems with the units, with the fuel for the units, and with the maintenance of the units. A number of the initial units are no longer operable and/or have been replaced.

From the Company's standpoint, these installations posed the threat of "uneconomic" bypass, which could have a substantial impact on other utility customers and on shareholders. In addition, the developers of the projects installed and operated those units in parallel with the Company's system without signing interconnection agreements, or addressing potential system impacts caused by parallel operation of their units. (This concern was addressed by developing and filing an interconnection tariff with the PUC.) Also, at least on the Big Island, the Company was concerned that application of its existing rate schedules to customers with on-site generation would not cover the cost of providing backup service to such customers. (This concern was addressed by including a standby service proposal in HELCO's rate case application filed October 25, 1995.) Finally the Company was skeptical of the environmental "benefits" of adding numerous fossil-fueled generators that avoided the need for emission controls based solely on their small size, not on their aggregate contribution.

Nonetheless, the Company recognized that certain DG technologies (microturbines, fuel cells and CHP systems) offer potential benefits to utility customers and society, and accelerated its efforts to obtain information regarding these emerging technologies.

Uneconomic Bypass

“Uneconomic bypass” occurs when the cost of a customer’s alternative source of electrical energy is lower than the cost of receiving service under the Company’s applicable standard rate schedule, but higher than the Company’s marginal cost of providing service.

Due to the manner in which rates have been established in Hawaii, the Company’s rates for its large commercial customers are not only higher than the Company’s marginal costs, but also are higher than its average embedded costs of providing service to such customers.

In Hawaii, fully allocated embedded cost-of-service studies are the starting point for the allocation of revenue requirements among rate classes. However, the rates for some classes (e.g., the residential class) have been set at a level that produces a lower-than-system average rate of return, while the rates for the remaining classes (e.g., the large power and commercial classes) produce a higher-than-system average rate of return as a result. This benefits the residential class, but only as long as large commercial customers do not leave the system because of rates that are higher due to the subsidy.²

The loss of a significant amount of load from the Company’s system due to uneconomic bypass would have an immediate and significant impact on the magnitude of the Company’s revenues and a corresponding adverse impact on the remaining customers’ rates. Rates would have to be set higher in future rate cases in order to allow for recovery of fixed costs that were previously recovered through energy sales to customers that subsequently add on-site generation facilities.

² These rate structures were established at a time when commercial and larger power customers had fewer options. The Companies have proposed changes in each rate case to reduce the subsidies (with the goal of eliminating them over time). Large power customers, principally the Department of Defense (DOD), have proposed larger changes. The Consumer Advocate, on behalf of residential customers, has opposed the reduction or proposed even more gradual changes. The Commission has been the ultimate arbiter of the public interest. The result has been very gradual change with more rapid changes on Oahu than on the neighbor islands.

There have also been issues in rate cases as to whether high load-factor customers are paying more than their “fair” share, because much of the demand cost has historically been embedded in the energy rates, instead of being included in demand charges. The history of addressing this intra-class “subsidy” issue is similar to that of the inter-class “subsidy” issue. Thus, high load factor customers are even more of a candidate for uneconomic bypass than are average Schedule J and P customers.

The Company's response to the bypass "threat" was three-fold: (1) it sought authority to offer rate discounts to certain commercial customers, so that it would eliminate the residential rate subsidy for at-risk customers through a Rule 4 standard form contract, and offer rates closer to its marginal costs of serving at-risk customers through a load retention tariff³; (2) it continued its on-going efforts to educate its customers with respect to the efficient use of electrical energy, which could be achieved through the installation of energy conservation measures⁴; and (3) it began to explore the longer term potential of offering DG/Cogen services, if that turned out to be a cost-effective means of meeting the needs of commercial customers and helping to address load growth.

Rule 4 Discounted Rate Contracts

With respect to rate discounts, HECO filed an application for approval to add a standard form contract for customer retention on April 1, 1999. The Commission allowed the modification to Rule 4 of HECO's tariff to take place, with certain conditions, by Order No. 16965, issued April 30, 1999 in Docket No. 99-0106. HELCO also filed an application for approval to add a standard form contract for customer retention on May 28, 1999. After initially suspending the tariff for internal review, the Commission allowed the tariff to become effective by Decision and Order No. 17600, issued March 10, 2000 in Docket No. 99-0177.⁵

The energy rate discounts offered under the Rule 4 standard form contract were set at amounts less than or equal to the percentage "subsidy" borne by the rate class. Thus, the rates (even with the discount) under the Rule 4 standard form contract were still well above marginal costs.

Hawaii's response to the "threat" of uneconomic bypass was typical of the mainland response, although it lagged the mainland response by about five years. As of the mid-1990's, 44 jurisdictions on the Mainland allowed customer retention rates for electric and/or gas utility companies. In addition, many mainland utilities were allowed to implement flexible rate discount tariffs. HECO and HELCO pursued this option, but

³ The purpose of offering rate discounts was not simply to retain customers at any cost, but was to retain customers in a way that would benefit customers that did not have the option of installing on-site generators. All of the Company's customers, including its residential customers, would benefit if large commercial businesses were retained as customers, so long as they paid rates higher than the Company's marginal costs, and thereby provided a significant contribution to the Company's fixed costs.

⁴ Consideration of such measures was made a condition for qualifying for a Rule 4 standard form contract.

⁵ HELCO has one Rule 4 standard form contract with Hilton Waikoloa Village, which was filed January 14, 2002.

were unable to implement such tariff proposals⁶ for technical reasons. See, e.g. Order No. 18043, issued September 21, 2000, and Order No. 18172, issued November 1, 2000, in Docket No. 00-0054.

Phase 2

The Company has systematically examined the growing technological feasibility⁷, and customer acceptance, of customer-sited DG/CHP technology since late 2000. By early 2001, the Company had determined that it needed more information on the technical and financial feasibility of DG/Cogen in Hawaii. The Company also concluded that it should look at DG/Cogen as a long-term business possibility, in which DG/Cogen would be offered as another customer option.

At the same time, the Company undertook an effort to look at possible alliance or joint venture partners, since this could result in the shortest lead time to implement and begin offering DG/Cogen products and services. Beginning in April 2001, the Company initially identified a list of 180 companies active in the DG industry, including energy service companies, equipment manufacturers, project developers and engineering companies.

The Company recognized that public policy was shifting toward increased support for distributed resources, including fossil-fueled, DG/Cogen technologies (as indicated by the efforts of the Department of Energy at the federal level, and DBEDT and a number of legislators at the State level). Nationally, there also was a trend toward increased DG installations, triggered in part by the California energy shortages and price spikes.

⁶ These tariffs would have allowed HECO and HELCO to offer larger discounts to qualifying at-risk customers, while still charging rates higher than the marginal costs of servicing such customers.

In competitive markets, the assumption is that prices will be based on marginal costs. Therefore, enabling the electric utility to compete by offering prices at or above its marginal costs of providing electricity fosters economically efficient competition, and avoids uneconomic bypass of the utility's system. As numerous utility commissions have recognized in allowing the use of flexible rates with a marginal costs floor, forcing the utility to compete on the basis of commercial rates higher than marginal costs (e.g., on the basis of rates that subsidize residential customers, and/or that reflect average embedded costs) would lead to uneconomic bypass of the utility system, and provide an "unfair" advantage to on-site generation.

HELCO contemplated a revised tariff filing that would address the technical deficiency identified by the Commission. However, in view of its evolving approach to DG/CHP, HELCO discontinued its efforts in that direction.

⁷ This summary addresses the Company's approach to DG/Cogen. At the same time, the Company is investigating the longer-term potential for microgeneration and fuel cell systems. For example, in March 2001 HECO initiated the research, development and demonstration (RD&D) testing of a small 30 kW microgeneration system sited on its Ward Avenue property. HECO engineers gained hands-on experience regarding DG fuel handling, noise abatement, and system operation and maintenance.

Finally, an increasing number of the Company's largest customers were being approached by DG vendors who "promised" electricity and other energy cost savings.

Phase 3

By October 2001, HECO had completed a more detailed review of DG/Cogen, from both a technical and business perspective. The Company determined in the fourth quarter of 2001 that the time was right to venture cautiously into DG/Cogen applications through demonstration projects and/or a limited number of pilot projects on selected customer sites, to assist the Company in obtaining hands-on experience and analysis of DG/Cogen reliability and cost. The Company recognized that where DG is provided by other vendors, utility energy sales are lost with the result that the remaining utility customers have to pick up the electric system fixed costs previously covered by electricity sales to those customers. The erosion of electricity sales could possibly be mitigated if DG were included as part of a customized energy solution in specific circumstances.

The Company opted to pursue its DG/Cogen opportunities as utility projects because the utility had the resources, expertise, and infrastructure to undertake the projects, the objectives of offering CHP services were utility objectives, and the Company did not want to appear to be pitting shareholders against ratepayers, which might be claimed if the Company entered into the CHP business on a non-utility basis. The Company decided that it could enter into the business without a joint venture partner, but authorized the retention of an energy services consultant, Onsite Energy Corporation ("Onsite"), which was one of the companies evaluated as part of its search for an alliance partner.

On October 30, 2001, HECO met with PUC Chairman Yamada, Commissioner Pai, and senior PUC staffers, to discuss HECO's proposed involvement in a limited number of distributed generation projects. HECO informed the Commissioners that it believed it was appropriate to be directly involved in DG projects as part of its regulated activities in order to (1) respond to customer interest in distributed generation, (2) gain experience in the design, installation and operation of distributed generation resources, and (3) assess the system benefit potential of distributed generation as a complement to central station generating resources. HECO's involvement in distributed generation on a regulated basis would offer the PUC and Consumer Advocate the opportunity to review and provide oversight to HECO's proposed distributed generation projects. Chairman Yamada was supportive of HECO's proposal to become involved in a limited number of "pilot" distributed generation projects so that information from these projects could be shared with the PUC and Consumer Advocate. The Chairman also made clear his expectation that these pilot projects would be subject to the same requirements as any non-utility distributed generation project.

Such an informal expression of support clearly did not constitute approval to undertake specific pilot projects. That could only come when a specific project, with a specific special Rule 4 contract, was presented to the Commission for approval by a filed application.

After the discussions with the PUC, the Company made the determination to pursue a limited number of pilot projects. The goal was to pursue perhaps five pilot projects (not including demonstration projects), although this was not a firm number. The possibilities included hotels such as the Hilton Hawaiian Village on Oahu, the Grand Wailea on Maui (for sites other than the pool RD&D project) and the Outrigger Waikoloa on the Big Island.

The need for PUC approval was explicitly communicated to potential pilot customers. For example, the April 2002 proposal to Hilton Hawaiian Village contained the following provisions:

Special Contract

“If HECO’s CHP concept proposal is acceptable to the Hilton, HECO will complete a 20% engineering design and prepare a Special Contract for signature by HECO and the Hilton, which would then be submitted to the PUC for approval. A Special Contract is required since the CHP asset will be utility-owned and operated and the thermal load will be provided to the Hilton at a discounted rate. Although we cannot predict when and if approval for the Special Contract will be granted, we estimate that this approval process may take from 90 to 180 days.”

Engineering Design

“Upon obtaining PUC approval for the Special Contract and CHP Project, HECO will complete the detailed engineering design within 180 days. The engineering design will focus on choosing specific CHP hardware and the preparation of engineering drawings, specifications, and more detailed construction cost estimates. During the preliminary and detailed engineering design, HECO personnel, its design consultants, contractors, and suppliers will require access to the hotel’s facilities, hotel personnel, and as-built drawings and reasonable assistance in gathering information and/or collecting data.”

In December 2001, at the Interconnection Workshop held in Honolulu and sponsored by DBEDT and the U.S. Department of Energy (“DOE”), HECO demonstrated

its ongoing efforts to integrate DG/CHP systems safely and without detrimental system impacts. HECO introduced a draft of its proposed Tariff Rule No. 14.H Interconnection Standards, developed in large part from the IEEE P1547 interconnection standards, and solicited comments from the attendees.

The Company filed a proposed interconnection tariff, including interconnection standards and a standard form of interconnection agreement, in January 2002, and submitted modifications agreed to by the Consumer Advocate in September 2002. The PUC conditionally approved the tariff in November 2002.⁸ The Company and the Consumer Advocate noted the PUC's observations in D&O 19773, and jointly submitted revisions in February 2003. The Revised Rule 14.H was approved in March 2003.⁹

In D&O 19773, the PUC reminded the Company that it has an "underlying objective of facilitating the development and use of distributed generation in the State", and "intends to closely monitor the utilities' and distributed generators' actions in achieving" that objective. The PUC also recognized that "distributed generation/interconnection is an evolving 'work in progress' in this State." (D&O 19773, page 12.)

In January 2002, MECO entered into a Memorandum of Understanding to evaluate potential CHP opportunities, including a potential small-scale RD&D CHP project at the Grand Wailea as indicated in the responses to the Commission's information requests provided under Part III.¹⁰ The RD&D project is a collaborative effort involving HECO, MECO, EPRI and the Grand Wailea and utilized technical support from the Company's consultant, Onsite. The RD&D Memorandum of Agreement to pursue the installation of a small-scale RD&D CHP project at the Bistro Molokini restaurant site was executed on June 26, 2002, and the RD&D CHP was operational by December 2002, with completion of commissioning activities in April 2003.

Organizational changes implemented at HECO beginning in early 2002 further promoted the active promulgation of feasible new energy-related technologies and alternatives that could meet the changing needs of customers. Dr. Karl E. Stahlkopf joined HECO in May 2002 as Senior Vice President, Energy Solutions and Technology, and Chief Technology Officer. By February 2003 the Energy Solutions and Technology area included Energy Initiatives, Technology, Energy Projects, Energy Services, Customer Installations, and Integrated Resource Planning. The newly combined departments and divisions pursue the common objectives of reducing Hawaii's reliance

⁸ Decision and Order No. 19773 (D&O 19773), issued November 15, 2002 in Docket No. 02-0051 (Consolidated).

⁹ Decision and Order No. 20056 (March 6, 2003).

¹⁰ A copy of the Memorandum of Understanding is provided in response to PUC-IR-4.

on fossil fuels, promoting viable energy technologies such as CHP and renewables for customer choice, and implementing demand-side management and demand-response options for load reduction and energy resource optimization.

In July 2002, in a submittal to the DBEDT study on "Creating Opportunities for Distributed Energy in Hawaii," HECO openly expressed support of DG/CHP as an element of the total energy solution array for customer choice, and as a component of a virtual electric system for var support, mitigation of line losses, and emergency standby power.

Phase 4

As discussed under item 4 of Part I, Hess Microgen ("Hess") re-approached the Company in November 2002 about the possibility of a teaming arrangement. It became clear from the Company's "due diligence" that CHP systems were becoming more standardized, more reliable and far less costly than were "one-off" design and build CHP projects. The Company concluded that it should be far more active in offering CHP systems to its customers, and commenced the development of a CHP tariff. A Teaming Agreement was signed with Hess on February 11, 2003.

On February 10, 2003, HECO met with two Commissioners to update the PUC on HECO's planned activities with respect to CHP. This was followed up with a call to the Director of the State Department of Commerce and Consumer Affairs. HECO informed the Commissioners that it would be entering into a Teaming Agreement with Hess to help facilitate the implementation of combined heat and power distributed generation resources in Hawaii. HECO believed it was appropriate to become directly involved in CHP projects because it was a natural adjunct to its strategy for a portfolio of resources to meet its customers' electrical needs – CHP projects, renewable resources, conservation, demand-side management energy efficiency programs as well as foundational central station generation resources. HECO explained to the Commissioners that there had been changes in the CHP marketplace, i.e., improved efficiency of the units, modular, assembly line production and reduced unit costs, all of which underscored the appropriateness for HECO to become directly involved in CHP. Utility customers' inquiries to HECO about the potential benefits of CHP were also increasing, a strong indicator of the strengthening desire for utility involvement. It was explained that HECO's partnership with Hess can be mutually beneficial because Hess' national experience, modular design and competitive pricing are complementary to HECO's experience in the operation and maintenance of generating equipment and fuel management. HECO's direct involvement in CHP would help to (1) reduce fossil fuel use through the increased efficiency of CHP units, (2) provide eligible customers with lower overall energy costs without any operational risk of the CHP unit, and (3) provide first hand experience on the operation and maintenance of CHP units and the opportunity to assess the system benefit potential to the utility system. HECO also explained to the

Commissioners that the Teaming Agreement with Hess is non-exclusive for the customer (i.e., the customer could work with HECO, the customer could work with any competitor directly, or the customer could work with Hess directly). Under the Teaming Agreement, HECO would exclusively purchase CHP units for systems under 1MW from Hess. Most importantly, HECO affirmed to the Commissioners that the Agreement does not obligate the utility to any purchase without PUC approval.

The HECO Teaming Agreement with Hess followed a two-year review by HECO of DG/CHP technological feasibility and customer adoption trends. HECO's pursuit of a utility CHP program is a natural outcome of this review, and is indicative of the Company's current focus on total energy solutions that benefit customers, expand the CHP market, and enhance the concept of a diverse and integrated electric system.

In late April 2003, Sentech, Inc. organized a group from Hawaii to respond to a DOE request for proposals (RFP) for regional combined heat and power demonstration centers to promote the use of combined heat and power systems. In an April 28, 2003 conference call held to discuss the details of the possible response to the DOE RFP, representatives from HECO, HNEI, the County of Maui, Pacific Machinery, Cummins West, Sentech, Gasco, and Ed Lui (the nominated director for the center) all committed to participate in the RFP response and pledged cash and in-kind services to support the center. It was agreed that the proposal would be submitted by DBEDT for Hawaii and that the scope would include Pacific Island nations as the targeted audience. In response to the organizational effort, Dr. Stahlkopf wrote to DBEDT on May 2, 2003 pledging HECO's support for the center and \$30,000 of cash and in-kind services for the years 2003 and 2004. If Hawaii is awarded DOE support for the demonstration center, all participants in the CHP market will benefit.

The key purpose of the demonstration center would be to promote the use of combined heat and power systems. The center would follow various projects developed in the region and serve as a clearinghouse for data so that anyone interested in the market would have access to information regarding the market potential and issues involved. The center would also collect data on emerging CHP technologies and help to promote advances in the market.

Dr. Stahlkopf noted in his letter to DBEDT that "Hawaiian Electric Company is currently in the process of developing for filing with the Hawaii PUC a standard tariff for CHP generated electricity and heat as well as standard form contracts for CHP projects to be developed by and owned and operated by Hawaiian Electric Company on customer premises."